Statistical Analysis of Cases Complaining Vertigo

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In 1949 Dr. McNally reported a review of two hundred cases of vertigo in the fourth International Congress of Otolaryngology (London). According to his report, a classification of the final diagnosis in all 200 cases is as follows: I. Labyrinthine lesions consist of Meniere's disease 78, pseudo-Meniere's disease 35, and intoxication of the labyrinth 5; II. Cardiovascular diseases consist of cardiac thrombosis 13, hypertension 25, hypotension 2, arteriosclerosis 3, rheumatic heart and cardiosclerosis 2; III. Lesions of the central nervous sysyem consist of head injury 9, Brain tumour 5, nervous lues 5, cerebral vascular lesion 2, encephalomyelitis 1, cerebral atrophy 2, multiple sclerosis 2 and cerebrovascular thrombosis 1; and IV. psychiatric diseases 8.

Dr. McNally's final diagnosis above mentioned is a collecting data in Montreal, not an industrial town. Therefore, in his data a small number of cases with head injury is contained.

Now we propose to deal with statistic data which were collected and studied in our Department of Otolaryngology, Yamaguchi University School of Medicine.

1. A series of 470 consecutive cases complaining vertigo were examined at our clinic from 1948 to 1959, A classification of final diagnostic category are as follows: Meniere's disease 129, pseudo-Meniere's disease 61, acoustic tumour 7, brain tumour 12, labyrinthitis 29, labyrinthine lues 20, inner ear lesion 29, head injury 102, streptomycin poisoning 28, intoxication of drugs 4, hypertension 3, vestibular neuritis 23, middle ear infection 12, and unknown 4.

As, shown in this classification of final diagnostic category, it is observed that Meniere's disease includes in 129 of 470 patients, a 27.4 percent incidence; head injury in 102 of 470 patients, a 21.7 percent incidence; and pseudo-meniere's disease in 61 of 470 patients, a 12.9 percent incidence.

Compared with the data reported by McNally, our data represents a great deal of an incidence of head injury, because Ube city is an industrial town.

2. Matsuda in 1960[1] studied statistic analysis in 280 patients with complaining vertigo examined at our clinic for the past five years. A classification of final diagnostic category in his data was as follows; head injury 75; Meniere's disease 71; labyrinthitis 68; brain tumour 16; streptomycin poisoning 13; labyrinthine lues 8; traumatic acoustic neuritis 25; hypertension 2; and epilepsy 2.

a. Spontaneous and positional nystagmus.

Spontaneous nystagmus was present in 130 of 280 patients. This represents an incidence of 47.2 percent. In patients with unilateral disturbance in the vestibular system, direction of the quick phase of nystagmus was towards the normal side in 53 of 90 patients (58.8 percent) and was toward the affected side in 37 of 90 patients (41.3 percent). Of these 90 patients, hypofunction of the vestibular response was seen in 77 patients, a 85 percent incidence, and hyperfunction represented in 13 patients, a 15 percent incidence.

Positional nystagmus was examined in 95 patients. These patients include 56 Meniere's disease, 14 head injury, 13 streptomycin poisoning and 12 brain tumour. Direction-fixed type of positional nystagmus was present in 16 of 56 patients with Meniere's disease (27.3 percent), in 3 of 14 patients with head injury (21.4 precent), in 2 of 13 patients with streptomycin poisoning (15.4 percent) and in 3 of 12 patients with brain tumour including acustic tumotr (25.0 percent). Direction changing type of positional nystagmus represented in 6 of 56 patients with Meniere's disease (10.9 percent), in 1 of 14 patients with head injury (7.2 percent), in 1 of 13 patients with streptomycin poisoning (7.7 percent) and in 1 of 12 patients with brain tumour (8.4 percent).

As to the unilateral vestibular disturbed patients, in patients with direction-frxed type of positional nystagmus, direction of the quick phase was toward the normal side in 69.8 percent and was towards the affected side in 30.2 percent.

b. Past pointing reaction.

Past pointing reaction was examined in 132 patients. These patients include 68 labyrinthitis, 44 Meniere's disease, 10 traumatic acoustic neuritis, 8 streptomycin poisoning and 2 acoustic tumour. Spontaneous past pointing occurred in 16 of 68 patients with labyrinthitis (23.5 percent), in 4 of 44 patients with Meniere's disease (9.1 percent), in 2 of 10 patients with traumatic acoustic neuritis (20 percent) and in 2 patients with acoustic tumour there was no past pointing. Spontaneous past pointing directed towards the affected side in 21 of 24 patients with unilateral vestibular disturbance (87.5 percent).

c. Stepping test.

Stepping test was performed on in 171 patients. These patients include 49 head injury, 44 Meniere's disease, 32 labyrinthits, 25 traumatic acoustic neuritis, 12 streptmycin poisoning, 8 inner ear lues and 1 brain tumour.

Abnormal response of stepping occurred in 28 of 49 patients with head injury (57.1 percent), in 29 of 44 patients with Meniere's disease (65.9 percent), in 24 of 32 patients with labyrinthitis (75.0 percent), in 11 of 25 patient with traumatic acoustic neuritis (41.6 perce nt), in 5 of 12 patients with streptomycin poisoning (41.6 percent), in 7 of 8 patients with inner ear lues (87.5 percent) and in 1 brain tumour. Direction of the deviation in stepping test was towards the affected side in 48 percent of all patients.

d. Righting reaction.

1). Romberg test.

Romberg test was performed on in 100 patients with complaining vertigo. These patients include 23 Meniere's disease, 35 head injury, 9 labyrinthitis, 7 inner ear lues, 1 brain tumour, 5 streptomycin poisoning and 20 traumatic acoustic neuritis. Romberg positive reaction occurred in 22 of 100 patients (22.0 percent); that is, 7 Meniere's disease, 8 head injury, 3 labyrinthitis, 3 inner ear lues, 1 brain tumour.

2). One-leg test.

One-leg test was performed on in 113 patients. In these patients, a classification of final diagnostic category and test results are shown in Table I.

As shown in Table I, abnormal reaction in one-leg test with eyes opened represents in 28.3%. On the other hand abnormal reaction in one-leg test with eyes closed occurs in over 50%.

Table. 1. Righting reaction tested by ong-leg test

Cases	Number	Abnormal reaction with eyes open	Abnormal reaction with eyes closed
Head injury	38	12(31.5%)	30(78.9%)
Meniere's disease	31	4(12.9%)	23(74.1%)
Labyrinthitis	21	6(28.5%)	18(85.7%)
Traumatic acoustic neuritis	9	2(22.2%)	4(44.4%)
Streptomycin P.	7	3(42.8%)	4(57.1%)
Inner ear lues	6	4(66.6%)	1 (100%)
Total	113	32(28.3%)	86(76.1%)

e. Rotatory nystagmus.

Rotatory nystamus tested by means of Barany's method (20 sec/10 rotation) in 280 patients with vertigo. These patients include 75 head injury, 71 Meniere's disease, 68 labyrinthitis, 16 brain tumour, 13 streptomycin poisoning, 8 inner ear lues, 25 traumatic acoustic neuritis, 2 hypertension and 2 epilepsy. Abnormal responses (hyponystagmus) represented in 62 patients. This represents an incidence of 22.1 percent.

f. Caloric nystagmus.

Caloric response was examined in 117 patients with complaining vertigo. Irrigation was performed with 20 cc. of water at 10° C in 5 seconds. The head of subjects was brought into the optimum position for the horizontal semicircular canal.

In Table II results obtained by the above mentioned methods are illustrated. Caloric abnormal response was present in 80 of 117 patients. This represents an incidence of p 8.3 percent. 80 patients include in 30 of 53 patients with head injury, in 26 of 33 patients with labyrinthitis, in 17 of 21 patients with Meniere's disease, in 3 of 5 patients with traumatic acoustic neuritis, in 3 of 4 patients with streptomycin poisoning and 1 acoustic tumour.

Table. 2. Caloric response (10° c, 20 cc) in 117 cases with vertigo

Case	Number	Normal response	Abnormal response
Head injury	53	23(43.4%)	30(56.6%)
Labyrinthitis	33	7(21.2%)	26(78.8%)
Meniere's D.	21	4(19.0%)	17(18.0%)
Traumatic acoustic neuritis	5	2(40.0%)	3(60.0%)
Streptomycin pois.	4	1(25.0%)	3(75.0%)
Acoustic tumour	1	0 (0.0%)	1(100.0%)
Total	117	37(31.0%)	80(68.3%)

g. Fistula symptom.

Fistula test was performed on in 1 32 patients with complaining vertigo. Fistula symptom was present in only 2 patients with labyrinthitis.

h. Audiometric response.

Audiometric response was examined in 280 patients (560 ears) with complaining vertigo. Results obtained are shown in Table III. Perceptive hearing loss was present in 44.3 percent, conductive in nature in 9.4 percent, mixed type in 33.0 percent and normal of hearing in 13.3 percent.

Table. 3. Audiometric response in 280 Patients with vertigo

Case	Number of ear	Perceptive H. loss	Conductive H. loss	Mixed type	Normal
Head injury	150	64	14	54	18
Meniere's D.	142	63	11	33	35
Labyrinthits	136	63	11	50	12
Brain tumour	32	7	5	12	8
Streptomycin P.	26	23	0	3	0
Inner ear lues	16	11	0	5	0
Traumatic acoustic Neuritis	50	17	8	25	0
Hypertension	4	0	2	0	2
Epilepsy	4	0	0	0	4
Total	560(100%)	248(44.3%)	53(9.4%)	184(33.0%)	75(13.3%)

Table. 4. Classification of final diagnosis in 377 cases with vertigo

Case	Number	Percent
Meniere's disease	195	51.72
Streptomycin poisoning	18	4.77
Circumscribed labyrinthitis	16	4.34
Inner ear lues	6	1.59
Inner ear trauma	5	1.32
Sea sickness	4	1.06
Benign positional vertigo	3	0.79
Middle ear disease	12	3.18
Head injury	43	11.40
Epilepsy	24	6.36
Cerebral vascular lesions	5	1.32
Brain tumour	4	1.06
Brain stem lesions	3	0.79
Hypertension	9	2.38
Hyotension	4	1.06
Arteriosclerosis	3	6.79
Anemia	6	1.59
Eye disease	12	3.17
Hormonal disease	3	0.79
Psychiatric disease	1	0.26
Sinusitis	1	0.26

Table. 5.

Age distribution

Age (Years)	Under 20	20–39	30–39	40–49	50–59	Over 60	Total
Number	24	66	116	82	60	29	377

Sex distribution

Male	211		
Female	166	Total	337

3. Akisada in 1967[2] reported results of the statistic analysis in a series of 377 consecutive patients complaining vertigo examined at our clinic for the past five years. A classification of the final diagnostic category in these 377 patients is illustrated in Table IV. As shown in Table IV, all 377 patients are composed of 259 ear lesions (68.70 percent), 79 central nervous lesions (20.96 percent), 22 cardiovascular lesions (5.84 percent), 12 ophthalmological diseases (3.18 percent) and 5 unknown lesions (1.32 percent). The majority of patients in this study are patients with the ear and central nervous lesions (338 cases, 89.65 percent). Age and sex distribution are tabulated as follows:

It will be seen that the disorder chiefly affects the age group 20 to 60 with preference for male.

a. Spontaneous and positional nystagmus.

Spontaneous nystagmus was present in 145 of 377 patients with vertigo (38.5 percent). In the majority of patients, that is 140 of 145 patients (96.5 percent), horizontal nystagmus was seen, and vertical nystagmus was present in only 5 patients (3.5 percent). With regard to classification of diagnostic category, the above mintioned data may be subdivided as follows: spontaneous nystagmus was present in 93 of 195 patients with Meniere's disease (47.6 percent) and in 28 of 79 patients with central nervous lesions (35.4 percent). In addition no spontaneous nystagmus was seen in patients with cardiovascular diseases, ophthalmological lesions and hormonal disturbances. In patients with unilateral lesions of the labyrinth and central nervous system, the direction of nystagmus was towards the affected side in 15 of 44 patients (34.1 percent) and towards the normal side in 29 (65.9 percent). The nystagmus was to the affected side in 10 of 33 patients with Meniere's disease (33.3 percent), and in 3 of 8 patients with central nervous sysyem lesions (37.5 percent).

Positional nystagmus was present in 150 of 321 patients with complaining vertigo (46.8 percent). In 150 patients with positional nystagmus,

direction-fixed type was seen in 126 (84.0 percent) and direction-changing type was present in 24 (16.0 percent). In 166 patients with Meniere's disease, positional nystagmus was present in 90 (54.2 percent), which was composed of direction-fixed type in 78 (86.7 percent) and directionchanging type in 12 (13.3 percent). In 70 patients with central nervous lesions, positional nystagmus was present in 29 (41.1 percent) of which 23 (79.3 percent) were direction-fixed in type and 6 (20.7 percent) were direction-changing in type. In cardiovascular lesions and hormonal disturbances positional nystagmus was present in about 10 percent.

b. Stepping test.

Stepping test was performed on in 255 patients with complaining vertigo. Deviation of the stepping was present in 67 (26.2 percent).

c. Righting reaction.

Romberg test was performed on in 310 patients with complaining vertigo. Romberg positive reaction was present in 29 (9.3 percent) which were composed of 11 Meniere's disease, 5 labyrinthine lesions (except Meniere's disease), 13 central nervous lesions. In unilateral disturbances of the vestibular system, falling or body sway were present to the affected side in 8 of 22 patients (36.4 percent) and to the normal side in 14 of 22 patients (63.6 percent).

Mann's test was performed on in 331 patients with complaining vertigo. Mann's test positive reaction was present in 112 (33.9 percent) which were composed of 65 Meniere's disease, 16 labyrinthine lesions (except Meniere's disease), 25 central nervous lesions, 3 cardiovascular lesions, 2 eye diseases and 1 unknown.

d. Caloric response.

Cold-warm test was performed on in 181 patients with complaining vertigo. Canal paresis was present in 63 (34.8 percent) and directional preponderance was present in 26 (14.4 percent) which were composed of 42 CP and 13 DP in Meniere's disease, 12 CP and 4 DP in the labyrinthine lesions (except Meniere's disease), and 10 CP and 9 DP in central nervous lesions.

Ice water test was performed on in 36 patients with complaining vertigo. Abnormal caloric response was present 17 (47.2 percent) - hyperresponse in 8 and hyporesponse in 9.

Cold air test was performed on in 149 patients with complaining vertigo. Abnormal responses were present in 57 (38.9 percent) - hyperresponse in 35 and hyporesponse in 21. In Meniere's disease abnormal response was present in 38 of 87 patients (43.6 percent) - hyperresponse in

Table. 6. Classification of final diagnosis in 1500 cases with vertigo

Case	Number	Percent
Labyrinthine disorder		
Meniere's disease	455	30.3
Atypical Meniere's disease	201	13.4
Toxic labyrinthitis	107	6.8
Labyrinthitis	101	6.6
Labyrinthine trauma	26	1.7
Central nervous system and psychiatric disease		
Post-traumatic	172	11.5
Brain tumour	51	3.4
Neurosyphilis	11	1.4
Cerebral atrophy	6	0.4
Multiple sclerosis	9	0.6
Arterial thrombosis	12	0.7
Epilepsy	39	2.0
Psychiatric disease	20	1.3
Drug poisoning	33	2.2
Cardiovascular system		
Hypertension	118	7.8
Hypotension	21	1.6
Anaemia	39	2.6
Arteriosclerosis	27	1.9
Coronary sclerosis	13	0.8
Hormonal disease		
Hypoglycaemia	13	0.8
Menstrual disturbance	12	0.8
Ocular disorder		
Eye strain	6	0.4
Congenital nystagmus	7	0.4

25 (65.7 percent) and hyporesponse in 13 (34.3 percent). In labyrinthine lesions except Meniere's disease abnormal responses were present in 14 of 31 (45 percent) - hyporesponse in 5 and hyperresponse in 9. In central nervous lesions abnormal response was present in 4 (16.6 percent).

4. Sekitani, Honjo and Tusjikawa in 1965[3] studied differential diagnosis in 1500 patients with complaining vertigo examined at our clinic for the past 17 years. A gross classification of the diagnostic category in 1500 patients is as follows: Labyrinthine disorders in 890 (58.8 percent); central nervous system and neuropsychiatric disorders in 354 (24.1

Table. 7. Results of the caloric test in vertigo

Case	Abnormal (Percent)	Normal (Percent)
Meniere's disease	91	9
Atypical Meniere's disease	79	21
Toxic labyrithitis	73	27
Labyrinthitis	84	16
Labyrinthine trauma	88	12
Central nervous system and psychiatric disease	63	37
Cardiovascular disease	6	94
Others	3	97

Table. 8. Caloric in vertigo coincidence between the affected side and the abnormal caloric test

Case	Coincided (Percent)	Not (Percent)
Meniere's disease	84	16
Atypical Meniere's disease	79	21
Toxic labyrinthitis	88	12
Labyrinthitis	84	16
Labyrinthine trauma	90	10
Central nervous system disease	73	27

precent); cardiovacular disorders in 218 (14.7 percent); endocrine disorders in 25 (1.6 percent); and ocular disorders in 14 (0.8 percent). A precise classification of diagnostic category is shown in Table VI. As shown in Table VI, Meniere's disease and atypical Meniere's disease include 43.7 percent, posttraumatic lesions include 11.5 percent and hypertension include 7.8 percent. Table VII and VIII illustrates caloric response tested by cold-warm examination in 1500 patients. In the majority of lesions, abnormal caloric responses are present more than normal responses except cardiovacular diseases or others. In unilateral vestibular disturbed lesions, abnormal caloric response in the affected side represents more than in the opposite side.

SUMMARY

In this paper, studies on the clinical statistical analysis of patients with complaining vertigo carried out at our clinic were summarized.

REFERENCES

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